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| 10/702,162 | 11/05/2003 | Christopher B. Rider | 85055MSS | 7309 |

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Milton S. Sales
Patent Legal Staff
Eastman Kodak Company
343 State Street
Rochester, NY 14650-2201

| EXAMINER | |
|---|---|
| TRINH, THANH TRUC | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/702,162 | RIDER, CHRISTOPHER B. | |
| | Examiner | Art Unit | |
| | Thanh-Truc Trinh | 1753 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *05 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) *17-22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/5/2003*.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-16, drawn to a product, classified in class 136, subclass 243

II. Claim 16-22, drawn to a method, classified in class 136, subclass 256.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by different methods such as electroplating.

Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

During a telephone conversation with the Applicant's representative, Mark Bocchetti, on 5/14/07 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-16. Affirmation of this election must be made by applicant in replying to this Office Action. Invention of Group II is withdrawn from further

consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Application is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 5 and 8-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Chalmers (US Patent 4379202).

Regarding claims 1 and 5, as seen in Figures 2 and 3, Chalmers discloses a photovoltaic device, comprising a photovoltaic conversion layer of n-type material (28) and p-type silicon (26); a first electrode (24) arranged on a first surface of the photovoltaic conversion layer; a second electrode (22) comprising one or more conductive tracks (fingers 34) arranged on the opposite second surface of the photovoltaic conversion layer to receive generated photoelectrons from the photovoltaic conversion layer, wherein the conductive tracks are made of metal (col. 3 lines 30-34); and a light concentrator (38) adjacent to the second electrode wherein the one or more conductive tracks are arranged in registration with the light concentrator such that

incident light is guided substantially through gaps between the one or more conductive tracks. (See Figure 3 and the light paths depicted on Figure 3).

Regarding claim 8, Chalmers discloses the light concentrator comprising a transparent support layer (44) having one or more light concentrating units arranged thereon. (See Figures 2 and 3, col. 3 lines 64-68 and col. 4 lines 29-38). It is the Examiner's position that a similarly shaped segment disclosed by Chalmers is a light concentrating unit.

Regarding claim 9, as seen in Figures 2 and 3, Chalmers discloses the photovoltaic conversion layer (of n-type 28 and p-type 26) being isotropic over an area which is greater than the area occupied by two light concentrating units.

Regarding claims 10-11, as seen in Figures 2 and 3, light travels through concentrating units (38) is bent or changed direction to avoid finger-like electrode 34, therefore the concentrating units incorporate refractive and diffractive structures.

Regarding claim 12, it has been known that as light passes from air to a transparent material with different refractive index, a fraction of the light reflected from the surface. A reference of Hawley Cartwright Charles et al. (US Patent 2207656, col. 1 lines 50-55 bridging col. 2 line 1) is used herein to support this concept. It is the Examiner's position that the transparent materials disclosed by Chalmers, see col. 3 lines 56-68, in use for layer 38 have different refractive indices than air, therefore the light concentrating units (38) incorporate reflective structures.

Regarding claim 13, Chalmers discloses conductive tracks (or fingers 34) are connected to bus 36 to form a conductive network. (See Figure 2)

Regarding claim 14, Chalmers teaches that the width of the conductive tracks (or individual fingers 34) needs not to be constant along their lengths. (See col. 8 lines 49-55). In other words, the width of the conductive tracks is varied across the device.

Regarding claim 15, Chalmers describes the degree of concentration provided by each of the one or more light concentrating units corresponds to the width of the conductive tracks surrounding the region illuminated by the corresponding light concentrator. (See Figure 3 and col. 4 lines 39-61)

2. Claims 1-3, 5, 9, 13 and 15-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Glatfelter et al. (US Patent 5228926).

Regarding claims 1 and 5, as seen in Figure 2, Glatfelter et al. disclose a photovoltaic device, comprising a photovoltaic conversion layer (12) formed from photoactive material (See col. 5 lines 47-68); a first electrode (10) arranged on a first surface of the photovoltaic conversion layer; a second electrode (14) comprising one or more conductive tracks (gridlines 16) arranged on the opposite second surface of the photovoltaic conversion layer to receive generated photoelectrons from the photovoltaic conversion layer, wherein the conductive tracks are made of metal (col. 6 lines 7-10); and a light concentrator (18) adjacent to the second electrode wherein the one or more conductive tracks are arranged in registration with the light concentrator such that incident light is guided substantially through gaps between the one or more conductive tracks. (See Figure 2 and the light paths depicted on Figure 2).

Regarding claims 2-3, Glatfelter et al. disclose the second electrode 14 comprising a transparent conductive layer of indium-tin oxide, or metal oxide, in electrical communication with the conductive track 16. (See Figure 2 and col. 6 lines 3-14).

Regarding claim 9, Glatfelter et al. disclose the photovoltaic conversion layer is isotropic over an area which is greater than the area occupied by two light concentrating units. (See Figure 5 and col. 12-22)

Regarding claim 13, Glatfelter et al. disclose the conductive tracks 34 connecting to a bus bar 42 to form a conductive network. (See Figure 4 and col. 7 lines 46-60)

Regarding claim 15, Glatfelter et al. disclose the degree of concentration provided by each of the one or more light concentrating units corresponds to the width of the conductive tracks surrounding the region illuminated by the corresponding light concentrator. (See Figure 2 and col. 6 lines 39-60)

Regarding claim 16, Glatfelter et al. disclose a contact area (terminal output 46, 48) for each of and in electrical communication with the first and second electrodes fro connection to an external circuit. (See col.7 lines 41-60).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 2-3 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chalmers (US Patent 4379202) in view of Glatfelter (US Patent 5228926).

Regarding claims 2-3 and 16, Chalmers discloses a photovoltaic device comprising a photovoltaic layer of (including layers of n-type 28 and p-type 26), a first electrode (24), a second electrode (22) and a light concentrator (38) as described in claim 1.

Chalmers does not teach that the second electrode comprising a transparent conductive layer in electrical communication with the conductive tracks, nor does he teach a contact area for each of and in electrical communication with the first and second electrodes for connection to an external circuit.

Glatfelter et al. disclose a second electrode comprising a transparent conductive layer 14 made of indium tin oxide in electrical communication the conductive tracks. (See Figure 2 and col. 6 lines 3-14)

Glatfelter et al. also teach providing a contact area (or output terminal 46, 48) for each of and in electrical communication with the first and second electrodes for connection to an external circuit. (See Figure 4 and col. 7 lines 41-60).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Chalmers by utilizing a second electrode comprising a transparent conductive layer such as metal oxide, because it would allow the light to pass through. (See col. 5 lines 29-31).

It would certainly have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Chalmers by providing a contact

area for each of the first and second electrodes as taught by Glatfelter et al., because it would provide an interconnection for smaller area photovoltaic cells into a large area module to increase power output. (See col. 7 lines 41-44).

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chalmers (US Patent 4379202) in view of Glatfelter et al. (US Patent 5228926) and further in view of Nakamura (US Patent 6291763).

Regarding claim 4, Chalmers and Glatfelter et al. disclose a photovoltaic device with transparent conductive layer as described in claim 2.

Neither Chalmers nor Glatfelter et al. teach that the transparent conductive layer incorporates a conductive polymer.

Nakamura teaches that a conductive polymer such as polythiophene can be incorporated with a transparent conductive layer. (See col. 27 lines 37-65 bridging col. 28 lines 1-21 and col. 28 lines 55-58).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of combination of Chalmers and Glatfelter et al. by incorporating conductive polymer to the transparent conductive layer as taught by Nakamura, because it would improve electrical conduction. (See col. 14 lines 66-67 bridging col. 15 lines 1-5)

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chalmers (US Patent 4379202) in view of Nakamura (US Patent 6291763).

Regarding claim 6, Chalmers discloses a photovoltaic device as described in claim 1.

Chalmers does not teach that the conductive tracks are made of a carbon-based material.

Nakamura teaches using carbon-base material as an electron-conductive layer. (See col. 15 lines 1-16).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Chalmers by making the conductive track of carbon-based material as taught by Nakamura because it would increase improve electron mobility. (See col. 15 lines 9-16)

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chalmers (US Patent 4379202) in view of Glatfelter et al. (US Patent 5228926).

Regarding claim 7, Chalmers discloses a photovoltaic device, wherein the conductive tracks are made of metal.

Chalmers does not teach that metal is material selected from gold, aluminum, nickel, copper, chromium, silver or alloys.

Glatfelter et al. teach using pure gold, silver and copper. (See col. 2 lines 13-16).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Chalmers by using metal of pure gold, silver or copper as taught by Glatfelter et al., because it would provide high conductivity. (See col. 2 lines 13-16)

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glatfelter et al. (US Patent 5228926) and in view of Nakamura (US Patent 6291763).

Regarding claim 4, Glatfelter et al. disclose a photovoltaic device with transparent conductive layer as described in claim 2.

Glatfelter et al. do not teach that the transparent conductive layer incorporates a conductive polymer.

Nakamura teaches that a conductive polymer such as polythiophene can be incorporated with a transparent conductive layer. (See col. 27 lines 37-65 bridging col. 28 lines 1-21 and col. 28 lines 55-58).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Glatfelter et al. by incorporating conductive polymer to the transparent conductive layer as taught by Nakamura, because it would improve electrical conduction. (See col. 14 lines 66-67 bridging col. 15 lines 1-5)

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glatfelter et al. (US Patent 5228926) in view of Nakamura (US Patent 6291763).

Regarding claim 6, Glatfelter et al. disclose a photovoltaic device as described in claim 1.

Glatfelter et al. do not teach that the conductive tracks are made of a carbon-based material.

Nakamura teaches using carbon-base material as an electron-conductive layer. (See col. 15 lines 1-16).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Glatfelter et al. by making the conductive track of carbon-based material as taught by Nakamura because it would increase improve electron mobility. (See col. 15 lines 9-16)

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glatfelter et al. (US Patent 5228926).

Regarding claim 7, Glatfelter et al. disclose a photovoltaic device, wherein the conductive tracks are made of metal.

Glatfelter et al. do not explicitly disclose in their invention that metal is a material selected from gold, aluminum, nickel, copper, chromium, silver and alloys.

Glatfelter et al. discuss a prior art using pure gold, silver and copper. (See col. 2 lines 13-16).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Glatfelter et al. by using metal of pure gold, silver, because it would provide high conductivity. (See col. 2 lines 13-16)

10. Claims 8 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glatfelter et al. (US Patent 5228926) in view of Chalmers (US Patent 4379202).

Regarding claim 8, Glatfelter et al. disclose a photovoltaic device comprising a photovoltaic conversion layer (12), a first electrode (10), a second electrode (14) comprising conductive tracks 16, and a light concentrator (18) as described in claim 1.

Glatfelter et al. do not teach the light concentrator comprises a transparent support layer.

Chalmers teaches a support layer (44) made of transparent material. (See Figure 2 and col. 4 lines 29-38).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify to device of Glatfelter et al. by using a transparent support layer as taught by Chalmers, because it would allow light getting to the photovoltaic conversion layer and at the same time holding the layers together. (See col. 4 lines 29-38 of Chalmers).

Regarding to claims 10-12, Glatfelter et al. describe the layer 18 deflecting light as seen in Figure 2, and being made of different material than air (col. 4 lines 14-29). Deflecting light is a characteristic of refractive and diffractive structures. Further, as light passes from air to a transparent material having a refractive index that is different than that of air, conversely the surface of transparent material reflects a fraction of light, as supported by Hawley Cartwright Charles et al. (US Patent 2207656, col. 1 lines 50-55 bridging col. 2 line 1). Therefore, the transparent layer 18 of Glatfelter et al. incorporates refractive, diffractive and reflective structures.

11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glatfelter et al. (US Patent 5228926) in view of Chalmers (US Patent 4379202).

Regarding claim 14, Glatfelter et al. disclose a photovoltaic device as described in claim 1.

Glatfelter et al. do not explicitly teach the width of the conductive tracks is varied across the surface.

Chalmers teaches the width of the conductive tracks needs not to be constant along the length. In other words, the width can be varied across the surface. (See col. 8 lines 49-55).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify to device of Glatfelter et al. by varying the width across the surface as taught by Chalmers, because it would give a variation in the structure. (See col. 8 lines 49-55).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh-Truc Trinh whose telephone number is 571-272-6594. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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5/25/2007

NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700